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ABSTRACT

Because an open door admissions policy results in a student body which varies greatly in background and developed capability to learn, the individualization of instruction is a top priority of El Paso Community College (Texas). In an attempt to determine the effects of two specific aspects of individualized instruction on the achievement of students in a music fundamentals course, the investigator used a sample of two groups of students during 1974-75. Fall semester students received self-paced instruction by programmed text and optional individual tutoring sessions, while spring semester students in the same course were additionally offered a series of group instructional sessions covering the same content as the text. In both courses students were evaluated by criterion-referenced tests for each of seven textual units. Resulting data showed an apparent superiority in achievement for the spring semester group. The study concludes that, for courses in music theory, a program which provides each student with a choice between self-paced programmed instruction and group instruction will lead to higher levels of achievement than will classes which are limited to one individualized learning strategy only. Recommendations for further research are made and research data, bibliography, and a literature review are included. (Author/JS)

AN INVESTIGATION OF THE EFFECTS OF SELECTED ASPECTS OF INDIVIDUALIZED INSTRUCTION ON THE ACHIEVEMENT OF STUDENTS

by

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ABSTRACT

The purpose of this study was to compare the effects on student achievement of: (1) self-paced, programed instruction, and (2) student choice between self-paced, programed instruction and group instruction over the same content.

One section of students in music fundamentals participated in a self-paced, programed, instructor-tutorial learning strategy. Another section of music fundamentals students were individually provided with a choice between self-paced, programed instruction and conventional group instruction.

Achievement measurement was criterion-referenced. The achievement scores of the two groups were analyzed with Chi Square. A significant difference in achievement was found, favoring the group which chose between two learning strategies.

It was concluded that, for courses in music theory, classes which provide each student with a choice between self-paced, programed instruction and group instruction will lead to higher levels of achievement than will classes which are limited to self-paced, programed instruction.

One recommendation was made for classroom practice: that courses in music fundamentals provide students with alternative learning strategies, with both self-paced and group learning situations available.

Three specific kinds of research were recommended:

1. Research which replicates this study, in music fundamentals.

2. Research which replicates this study, but conducted in other academic areas.

3. Research which attempts to identify the proportionate contributions which self-paced, programed instruction and group instruction make to the achievement of students in music fundamentals in a completely free choice situation.

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CHAPTER I

STATEMENT OF THE PROBLEM

BACKGROUND OF THE STUDY

El Paso Community College accepts broad responsibility for the provision of post-secondary education to the citizens of El Paso, Texas. The mission of the College, as summarized in its most recent catalogue, is to provide the opportunity for higher education to all citizens who can profit from the experience, and to aid those who grow and mature during an age of rapid social change to become fully participating members of society.

The College has adopted an open door policy for admissions. It admits any person who has attained a high school diploma or its equivalent, or who is at least eighteen and whose high school class has graduated.

The open door policy, as described above, and to which the College adheres, results in a student body which varies greatly in background and in developed capability to learn. In order to serve the diversified needs of the individual, The El Paso Community College Board of Trustees and the administrative staff have attempted to provide institutional direction by identifying the systematizing and individualizing of instruction as one of its basic thrusts.

Establishment of policies which attempt to institu-

tionalize the individualization of instruction is relatively simple; the translation of policies into the standard practices of teachers is much more difficult. Traditionally oriented teachers tend to resist institutional efforts to modify their instructional methods. The resistance will be strong when the recommended new methods require the extensive time and effort which are required for conversion from traditional patterns of instruction to individualized instruction. Attempts to effect the changes in the actual instructional patterns in an institution would have increased chances for success if examples of their effectiveness, in the form of operating models within the institution, or in the form of reports of research, were available. This practicum is designed as an initial step in that direction.

The term "individualized instruction" is being used extensively today. The practice of individualized instruction is widely recommended, particularly for educational institutions which have student bodies as diverse in background and in developed capability to learn as that of the typical community college. As the term is typically used, it either means self-paced learning, or the specific meaning is not clearly defined. Efforts to institutionalize individualized instruction, and efforts to conduct research about it, will be hampered by both the unduly restricted meaning and the lack of clarity of meaning.

This investigator has developed, from readings in instructional methodology, a structure for individualized

instruction which includes four specific aspects: (1) self-pacing, (2) student voice in goals, (3) diagnosis and flexible entry, and (4) student choice of alternative instructional strategies. An extensive study of the effects of these four aspects of individualized instruction, singly and in various combinations, on the achievement of students would be desirable, but would be beyond the reasonable expectations for a module practicum. For the immediate purposes of this practicum, the investigator has selected two of these aspects for study.

THE PROBLEM

Statement of the Problem

The purpose of this study was to compare the effects of two aspects of individualized instruction on student achievement in a course in music fundamentals. The specific aspects of individualized instruction to be investigated are: (1) self-pacing, using programed materials, and (2) student choice between alternative instructional strategies. The alternative strategies available for student choice were the same programed self-paced strategy and a group instructional situation.

Importance of the Study

The results and conclusions of this study will have direct application to courses in music theory. There will be application to a lesser degree in subject matter areas

similar in cognitive level and structure. The subject matter of music fundamentals is such that convergent mental skills are of greater importance than divergent skills. The findings from this study might apply in other disci- which similarly require convergence.

El Paso Community College president Alfredo G. de los Santos has given top priority to the individualization of instruction. He has expressed the urgent need for implementing this system of learning in order to further endeavors toward reaching the goals of the institution.

In order to adhere to these desires, the investigator has made an effort to implement this type of instruction and furthermore hopes to add to the available research by comparing two specific aspects of individualized instruction in terms of their effects on the achievement of students.

Summary

Chapter I has presented the problem and discussed its significance. Chapter II will present a review of the related literature. Chapter III will describe the methods of procedure used in the study. Chapter IV will present the data produced. Chapter V will summarize the study and present conclusions and recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

This study is an attempt to compare two facets of individualized instruction on the achievement of students in a course in Music Fundamentals at El Paso Community College. The review of the literature will survey: (1) the degree of advocacy of individualized instruction at the college level, (2) the status of research in instructional methods, and (3) the research with regard to the effectiveness of programed instruction in music theory courses.

ADVOCACY OF INDIVIDUALIZED INSTRUCTION

The literature in curriculum and instruction includes many references concerning the need for individualized instruction. This is particularly prevalent in the area of community college instruction. Only a small sample of these references will be cited here.

Herrscher aptly describes the need for innovations in college level instruction:

> The national commitment to equality of higher educational opportunity and to accountability for student learning has created many complex problems, at the center of which is the need for significant modifications in traditional methods of college-level instruction. Sweeping changes in instructional methodology are necessary to accomodate not only the educational aspirations, but the fundamental and pervasive learning problems of large and growing segments of college populations which are obviously not composed of traditional college-level students (i.e., low-achieving, minority groups, socio-

economically deprived, culturally disadvantaged, handicapped) for whom it should have the greatest meaning. To date, equal opportunity in higher education has been more a slogan than a fact, for as many as 75 percent of low-achieving students withdraw in the first year.[1]

Gronlund, beginning with the same rationale, presents the case for individualized instruction:

> The wide range of individual differences among students makes it unlikely that group instruction alone, with or without ability grouping, can meet the varied needs of the students. Some type of adaptation in the instructional program is needed so that more individualized learning experiences can be provided. This is essentially what is meant by individualizing classroom instruction.[2]

Johnson is in close agreement with both Herrscher and Gronlund about the need for innovation which includes individualization, and finds considerable evidence that innovation is taking place. He decries, however, an apparently uncritical attitude toward innovation:

> There is a paucity of evidence regarding the success of new developments in junior college teaching. Evaluation of instruction is largely a missing entity in the junior colleges of our nation, as it is indeed in most of American education.[3]

The potential outcome of innovation which includes individualization, and which accepts responsibility for

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[1]Barton R. Herrscher, Implementing Individualized Instruction, (Houston, Texas: ArChem Company Publishers, 1971), p. 1.

[2]Norman E. Gronlund, Individualizing Classroom Instruction, (New York: Macmillan Publishing Co., Inc., 1974), pp. 1,2.

[3]B. Lamar Johnson, "Toward Change and Improvement in Junior College Instruction" in B. Lamar Johnson, ed., "The Improvement of Junior College Instruction," (Los Angeles: The University of California at Los Angeles, 1970), p. 95.

evaluation and improvement, has been succinctly stated by Bloom:

> We are convinced that the grade of A as an index of mastery of a subject can, under appropriate conditions, be achieved by up to 95 percent of the students in a class.[4]

El Paso Community College has expressed its commitment to the concept and to the processes of individualization:

> In order to promote the institution's philosophy and goals, the EPCC Board of Trustees and Administrative staff have attempted to provide further institutional direction by approving the following four basic thrusts: 1. the systematizing and individualizing of instruction. .....[5]

The charge has thus been given to those who are involved in instruction in higher education to concentrate on the needs and learning characteristics of individual learners, and to develop instructional programs which provide for those individual needs and characteristics.

The next section will review literature pertaining to the status of research in the methods of instruction.

STATUS OF METHODS RESEARCH

The current study is, in a sense, in the category of research in instructional methods. A brief but representative review of the status of research in instructional methods will prepare for the more specific review which

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[4] Benjamin S. Bloom, "Learning for Mastery", Evaluation Comment I:2 (May, 1968), p. 4

[5] El Paso Community College, Faculty Orientation Handbook, (El Paso, Texas, 1974), p. 3.

follows.

Gage summarizes the history of research on teaching effectiveness, including comparative studies of instructional methods:

> Research on teaching has been going on for almost as long as research on learning. Some studies were made in the 1910's and 1920's, and quite a few were made during the 1930's. By the early 1950's, substantial reviews and bibliographies of research on teaching began to appear. And during the past decade, the flow of research on teaching has indeed become significant. But the early years did not pay off in solid, replicable, meaningful results that had considerable theoretical or practical value. Positive and significant results were seldom forthcoming, and they survived replication even less often. The research yielded many findings that did not make sense, that did not hang together in any meaningful way.[6]

Lumsdaine shares the view of Gage about the meaningfulness of research on methods, and adds his hypothesis:

> The conclusion may be a discouraging one, but the most important variable in the effectiveness of instruction all too often seems to be simply the amount of time which is spent in instruction... Too often the procedures which are shown to be better just happen to be also the procedures that take more time...[7]

The history of research on methods is, as described by Gage and Lumsdaine, one of repeated "no significant difference", or of results which can be ascribed to some

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[6] Nathaniel L. Gage, "An Analytical Approach to Research on Instructional Methods", in Herbert J. Klausmeier and George T. O'Hearn, Research and Development Toward the Improvement of Education, (Madison, Wisconsin: Dembar Educational Research Services, Inc., 1968), p. 120.

[7] Arthur A. Lumsdaine, "Instructional Research: Some Aspects of its Status", in Herbert J. Klausmeier and George T. O'Hearn, Research and Development Toward the Improvement of Education, (Madison, Wisconsin: Dembar Educational Research Services, Inc., 1968), p. 100.

variable not included in the study, such as time.

The studies which have compared programed instruction with so-called traditional instruction appear to have produced no more clear evidence than have other methods studies. In the 1960 Encyclopedia of Educational Research Stolurow reports that the most common finding is again no significant difference when programed instruction is compared with traditional. He goes on to say that programed instruction has demonstrated its effectiveness, and states that the major problem which remains is the identification of the most effective ways to employ programed instruction.[8]

The next section will deal with research in instruction in music theory, particularly that in the area of programed instruction.

RESEARCH IN PROGRAMED INSTRUCTION IN MUSIC THEORY

The generalizations drawn by Stolurow about the effectiveness of programed instruction are borne out by a review of methods research in instruction in music theory. Kanable[9] and Michalski[10] reported no significant difference

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[8]Lawrence M. Stolurow, "Programed Instruction" in Encyclopedia of Educational Research, 1969, p. 1020.

[9,10]Betty Kanable, "An Experimental Study Comparing Programed Instruction with Classroom Teaching of Sightsinging", and Stanley F. Michalski, Jr., "Development and Evaluation of a Visual-Aural Program in Conceptual Understanding of the Basic Elements of Music", Journal of Research in Music Education, XVII: 2 (Summer, 1960), p. 224, and XIX: 1 (Spring, 1971), pp. 96-97.

in achievement between programed instruction and traditional instruction in sightsinging and in basic elements of music. Carlsen[11], Ashford[12], Fink[13], and Ihrke[14], reported programed instruction to be significantly more effective than traditional group instruction in achievement in various topics of music theory.

The effectiveness of programed instruction for music theory courses appears to be well established, since either a report of no significant difference or a significant difference which favors programed instruction implies effectiveness.

Some researchers have made recommendations about ways of using programed instruction as part of the instructional pattern in music theory; two of these have been selected for mention here. Ashford says:

> The conclusions of this study have also seemed to imply that the combination of programed instruction and teacher-classroom methods may be implemental in solving

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[11] James C. Carlsen, "Programed Learning in Melodic Dictation", Journal of Research in Music Education, XII:2 (Summer, 1964). p. 147

[12] Theodore H. A. Ashford, "The Uses Of Programed Instruction to Teach Fundamental Concepts in Music Theory", Journal of Research in Music Education, XIV: 3 (Fall, 1966), pp. 175-76.

[13] Robert R. Fink, "Programed Part Writing", Journal of Research in Music Education, XV: 2 (Summer, 1967), p. 164.

[14] Walter R. Ihrke, "Automated Music Training: Final Report on Phase One", Journal of Research in Music Education, XIX: 4 (Winter, 1971), pp. 478-79.

the problems of teaching theory...[15]

Carlsen recommends:

> In practical application, there is much to indicate that programed instruction's greatest efficiency will be found only when it is not restricted to being the sole educational source...[16]

Thus two researchers who have found programed instruction to be effective in music theory recommend that in practical classroom applications programed instruction be combined with other approaches, including group instruction. No research studies have been found which bear on such combinations, either as student choice or with both programed instruction and the other alternative required. The current study will attempt to make a beginning in such research.

This chapter has reviewed the literature pertinent to the problem under investigation. Chapter III will describe the procedures to be followed in the study.

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[15] Theodore H. A. Ashford, op. cit. p. 177.

[16] James C. Carlsen, loc. cit.

CHAPTER III

METHODS OF PROCEDURE

The purpose of this chapter is to describe the procedures followed in the study, including: (1) the groups of students included, (2) the instructional strategies of the two instructional treatments, (3) the techniques used for measuring achievement, and (4) the statistical procedures used in the analysis of the data.

STUDENT GROUPS

This study involved two sections of Music 3111, The Fundamentals of Music, taught at El Paso Community College. One section of the course was taught during the fall semester, 1974; the other was taught during the spring of 1975. The students in these two sections were all those who enrolled in the course during normal registration procedures, and who appeared for the first day's instruction. No pre-instructional measures were administered, and no selection procedures were used. It is assumed that the groups which were thus formed may be considered to be a random sample of prospective students in Music Fundamentals.

INSTRUCTIONAL STRATEGIES

The instructional strategies used during the two semesters were both variations of individualized instruction.

During the fall semester, 1974, a programed text was used. Students had purchased the text, and were advised that they could work on it both in class and outside of class. The instructor was available at scheduled class sessions for individual tutoring. The initiative for the tutoring sessions could be either from the student as he or she perceived the need, or from the instructor as individual needs were identified from monitoring the individual student records. There was no group instruction except as some tutoring sessions involved as many as four or five students with the instructor working on the same problem. Students were encouraged to call the instructor in the evenings for assistance with specific concepts; some availed themselves of the opportunity.

During the spring semester, 1975, the programed text was continued in use, again with tutorial assistance available. A series of group instructional sessions, covering the same content as the programed text, was available as an instructional alternative to the program. Any student could make free choice of either of the two instructional alternatives, or make full use of both. During the spring semester, then, a student could select learning experiences to fit his own learning style.

TECHNIQUES FOR MEASURING ACHIEVEMENT

As outlined in the preceding section, two groups of students were included in the study; the fall semester

students used individualized self-paced instruction, and the spring semester students used self-paced instruction as one alternative, with group instruction available as the other alternative.

The programed textbook which was used was divided into seven instructional units. Seven criterion-referenced tests were developed, one for each unit. The criterion of 93 percent was established as the measure of success for each test. By referring to a prepared self-evaluation test, each student determined for himself when he was sufficiently prepared on a given unit to take the unit test. If his score on the test met the criterion, he moved on to the next unit; if the score did not meet the criterion, he was recycled on the unit. Copies of the unit criterion tests are shown in the Appendix.

The evaluation of the achievement of a student for the course was based on the number of units which had been completed to criterion levels, that is:

Grade of A: Criterion performance in all seven units

Grade of B: Criterion performance in six units

Grade of C: Criterion performance in five units

Grade of D: Criterion performance in four units

Grade of F: Failure to demonstrate criterion performance in at least four units.

Completion of Unit VII to criterion prior to the scheduled end of the semester marked the end of the course for that student. A student who had not completed all seven units by

the end of the semester was informed of the grade earned as of that time, and given the option of accepting that grade or of continuing into the following semester to work toward completion.

The measurement of achievement for the purpose of comparison in a self-paced, open schedule course requires that a time be established at which the measurement is to be taken. For the purpose of this study, the time set for the measurement of achievement was the end of the semester in which the course was scheduled. The achievement score for each student was determined by the number of units which he had completed to criterion at that time.

PROCEDURES FOR STATISTICAL ANALYSIS

The use of criterion-referenced tests, and the classification of each student as either successful or not successful on each unit test according to whether he reaches a stated criterion, places each student into one of two categories for each unit test. The further classification of students according to the number of units successfully completed divides the students into several classes, or categories. The reporting of achievement in terms of frequencies within categories leads to the use of a statistical procedure such as Chi Square for the analysis of the data. This study used methods of computation of Chi Square as recommended by Spence.[1]

This chapter has described the procedures to be followed in the study. Chapter IV will present the data obtained.

[1]Janet T. Spence, et al, Elementary Statistics, (New York: Appleton-Century-Crofts, 1968), pp. 195-204.

CHAPTER IV

PRESENTATION OF THE DATA

This study was designed to investigate whether two different strategies of individualized instruction would result in differential effects on the achievement of the two groups of students involved. During the fall semester, 1974, one section of students in music fundamentals participated in a self-paced, programed, instructor-tutorial learning strategy. During the spring semester, 1975, one section of music fundamentals students were individually provided with two alternative learning strategies from which each was to choose. One choice was identical to the fall strategy; the other was a series of group instruction sessions which covered the same content. Achievement measurement for both groups was criterion-referenced, with the same tests used. The criterion performance level of 93 percent was set for each of the seven units included in the course, and the final course grade for each student determined by the number of units completed successfully. For the purpose of this study, the achievement measurement was taken at the end of the scheduled semester, although, because of the nature of individualized instruction, the individual had the right to continue study beyond that time.

The achievement scores of the two groups appear in Table I:

TABLE I

NUMBERS OF STUDENTS WHO COMPLETED SPECIFIED NUMBERS OF UNITS

Units Completed	Fall Semester Number of Students	Spring Semester Number of Students
7	12	19
6	2	0
5	2	1
4	3	3
3 or fewer	7	3

The data in Table I shows an apparent superiority in achievement for students in the spring semester. Nineteen of twenty-six spring semester students completed all seven units during the scheduled semester, as compared with twelve of twenty-six fall semester students. Three spring semester students failed to complete the four units necessary for a passing grade as compared with seven fall semester students.

The data was analyzed using Chi Square, with these results:

Computed Chi Square: 3.92

Chi Square .05 : 3.84

Since the computed value of Chi Square exceeds the five per-

cent value, the observed difference in achievement between the spring semester students is judged to be significant, and the instructional strategy which provides students with a choice between two learning strategies is judged to be significantly more effective in this situation than is the single self-paced strategy.

This chapter has presented the data for the study. Chapter V present a discussion of the study, conclusions, and recommendations.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This investigation was an attempt to determine the effects which two specific aspects of individualized instruction have on the achievement of students in a course in music fundamentals. The specific aspects of individualized instruction which were included in the study were self-pacing, and the provision of a choice between two learning strategies.

The course in Music Fundamentals, Music 3111, was taught by the investigator during the fall semester, 1974, and during the spring semester, 1975. During the fall semester the only instructional strategy used was self-pacing, using programed materials, with the investigator serving as resource person and tutor-on-call. During the spring semester the students were presented with a choice between the programed, self-paced instruction and a series of group presentations of the same content, presented by the investigator.

Criterion-referenced tests were administered to all students of both semesters, and the same standards of achievement were applied to both. Records of achievement were kept for both semesters.

The use of criterion-referenced testing, and the resulting categorization of students led to the use of Chi

Square for the analysis of the data.

A simple tabulation of the achievement records of the two groups of students showed an apparent superiority in achievement for the spring semester, alternative learning strategy group. Application of Chi Square to the data indicated that this achievement difference was significant at the .05 level.

CONCLUSION

It is the conclusion of this study that, for courses in music theory, courses which provide each student with a choice between self-paced, programed instruction and group instruction will lead to higher levels of achievement than will classes which are limited to self-paced, programed.

RECOMMENDATIONS

The findings of this study point to one recommendation for application in classroom situations, and to three recommendations for further research.

Recommendation for Classroom Use

It is recommended that any music fundamentals course, or any comparable music theory course, at the community college level provide students with alternative learning strategies, with both self-paced and group learning situations available. The results of this study show significantly greater achievement in the choice situation, in which some students chose self-pacing, while others chose the

group strategy.

Recommendations for Research

The results of this study indicate the need for three specific kinds of research.

1. Research which replicates this study in instruction in music theory. As Gage has commented, methods studies have rarely survived replication[1]; replication is needed to determine whether significant differences will be found consistently.

2. Research which replicates this study, but conducted in other academic areas. Such studies would be particularly appropriate in courses which, as does music fundamentals, have content which requires skills of mental convergence.[2]

3. Research which attempts to identify the proportionate contributions which self-pace, programed instruction and group instruction make to the achievement of students in music fundamentals in a completely free choice situation. It is likely that several students in the learning alternatives group of the current study chose to take part in both the programed experiences and the group instruction experiences. It is possible that Lumsdaine's hypo-

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[1]See quotation from Gage, page 8 of this study.

[2]See this study, pp. 3,4.

thesis about time spent in instruction as a factor in the achievement of students[3] applies in this study. Research needs to be conducted to identify such relationship if it exists.

[3]See quotation from Lumsdaine, page 8 of this study.

BIBLIOGRAPHY

Ashford, Theodore H. A. "The Use of Programed Instruction to Teach Fundamental Concepts in Music Theory", Journal of Research in Music Education, 1966, 14; 171-177.

Banathy, Bela H. Instructional Systems, Belmont, California: Fearon Publishers, 1968.

Bloom, Benjamin S. "Learning for Mastery", Evaluation Comment, 1968, 1, 1-12.

Carlsen, James C. "Programed Learning in Melodic Dictation", Journal of Research in Music Education, 1964, 12, 139-148.

Costanza, A. Peter. "Programed Instruction in Score Reading Skills", Journal of Research in Music Education, 1971, 19, 453-459.

El Paso Community College. Faculty Orientation Handbook, El Paso, Texas: El Paso Community College, 1974.

Fink, Robert R. "Programed Part Writing", Journal of Research in Music Education, 15, 159-164.

Gronlund, Norman E. Individualizing Classroom Instruction, New York: The MacMillan Company, 1974.

_____, Preparing Criterion-Referenced Tests for Classroom Instruction, New Yor: The MasMillan Company, 1973.

Herrscher, Barton R. Implementing Individualized Instruction, Houston, Texas: Ar Chem Company, 1971.

_____, Dayton Y. Roberts and John E. Rouche. Curriculum Development, Fort Lauderdale, Florida: Nova University National Ed. D. Program for Community College Faculty, 1973.

Ihrke, Walter R. "Automated Music Training: Final Report on Phase One", Journal of Research in Music Education, 1971, 19, 474-480.

Johnson, B. Lamar, ed. The Improvement of Junior College Instruction, Occasional Report No. 15, Los Angeles, California: University of California at Los Angeles, 1970.

Kanable, Betty. "An Experimental Study Comparing Programed Instruction with Classroom Teaching of Sightsinging", Journal of Research in Music Education, 1969, 17, 217-226.

Klausmeier, Herbert J. and George T. O'Hearn. Research and Development Toward the Improvement of Education, Madison, Wisconsin: Dembar Educational Research Services, Inc., 1968.

Michalski, Stanley F., Jr. "Development and Evaluation of a Visual-Aural Program in Conceptual Understanding of the Basic Elements of Music", Journal of Research in Music Education, 1971, 19, 92-97.

Popham, W. James and Eva L. Baker, Systematic Instruction, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970.

Spence, Janet T., and others. Elementary Statistics, New York: Appleton-Century-Crofts, 1968.

Stolurow, Lawrence M. "Programed Instruction", Encyclopedia of Educational Research, 1969, 1017-1022.

Warren, Jonathan R. "Adapting Instruction to Styles of Learning", Findings, Princeton, New Jersey: Educational Testing Service, 1974, 1 , 1-4.

Westbury, Ian and Arno A. Bellack. Research into Classroom Processes, New York: Teachers College Press, 1971.